United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
1400 Independence Road
Mail Stop 200
Rolla, Missouri 65401

Site: Synthetic Verona
ID # MOD007459154
Break: 3.4
Other:
6-10-82

June 10, 1982

Mr. Kenneth S. Ritchey
Regional Dioxin Coordinator
Waste Management Branch
U.S. Environmental Protection Agency, Region VII
324 East Eleventh Street
Kansas City, Missouri 64106

Dear Mr. Ritchey:

I have enclosed a revised copy of the proposal entitled, "Hydrology of the Verona-Aurora area, southwestern Missouri." This revised copy contains the additional study component of sediment transport in the Spring River. As discussed with you, we think this information is a needed addition to the earlier proposal. We also have included your suggestion to the study problem, and have also made several other changes to the proposal.

We also will be sending a copy of this proposal to our Regional Headquarters in Denver, Colo., for their evaluation and review. I look forward to our office participating in this study.

Sincerely yours,

Daniel P. Bauer

Daniel P. Bauer
District Chief

Enclosure

cc: Regional Hydrologist
USGS, WRD, CR
Lakewood, Colo. 80225
w/enc.

J. H. Williams
DNR, Div. of Geol. & Land Survey
P.O. Box 250
Rolla, Mo. 65401
w/enc.

107/7-02469

HYDROLOGY OF THE VERONA-AURORA AREA, SOUTHWESTERN MISSOURI

Problem:

Streambed material and alluvium may be contaminated with dioxin in the upstream part of the Spring River basin. Dioxin has been reported in samples of fish taken from the Spring River as far as 45 miles downstream from Verona where the contamination appears to have originated. The dioxin is a waste byproduct of hexachloraphene and agent orange that was manufactured at Syntex's Verona plant during the period 1968-72. The chemical wastes were placed in metal containers and may be buried in trenches near Verona, and possibly in the Baldwin Park area near Aurora. Deterioration of the containers and subsequent leakage of the wastes may result in the contamination problem. Although some of the waste material has been removed and stored, wastes may still remain in trenches and are known to exist at other locations in the upstream part of the Spring River watershed. This area is in a karst limestone terrane. Some of the surface flow is lost through permeable soil into solution-affected limestone. Whereas there is no evidence that wells or springs have been affected, geologic and ground-water studies have not been completed. There also is a possibility that ground water in the Baldwin Park vicinity at Aurora could drain toward the east into adjacent watersheds rather than into the Spring River watershed.

Objective:

The objective is to determine the water movement and sediment characteristics in the Verona-Aurora area so that flow transport mechanisms would be known if water contamination from dioxin occurred.

Study area:

The study area includes approximately 180 square miles in southern Lawrence County in southwestern Missouri (fig. 1). Most of the area is in the upstream part of the Spring River basin. Verona and Aurora are located in the south-central part of the study area.

Available information:

Some well data are available at the Division of Geology and Land Survey (DG&LS) office. A large number of records concerning streamflow, losing and gaining streams, and springs exist at the U.S. Geological Survey, Water Resources Division (USGS, WRD) at Rolla. Existing geologic maps at the DG&LS office will be used in the completion of geologic studies. Mine locations and drill-hole information in the Baldwin Park vicinity also are available.

Information to be obtained:

A general geologic map will be prepared by DG&LS. A Pennsylvanian-age sandstone valley fill deposit near Aurora and its possible effect on ground-water flow near Baldwin Park is of particular interest. Additional water-well information, such as depth, casing depth, static water level, and other drilling information will be collected by a door-to-door inventory. Drilling information of particular importance includes depth that water was first encountered during drilling, response of water levels during and after drilling, records of openings encountered, well production, and soil thickness. Seasonal water-level fluctuations also would be of interest. Springs will be located and their recharge source determined by inference from ground-water levels and supplementary dye traces. For example, does the spring derive water from alluvial sediments, overburden materials, or bedrock? Spring elevations would be determined from topographic maps. The Irwin Spring and its relationship to the Spring River is of particular interest. The DG&LS and the USGS will work jointly on collecting information on water wells and springs.

Water loss and water gain in streams will be measured and losing and gaining streams will be identified throughout the upper watershed, but with more detailed effort near Verona and Aurora. Present records indicate losing reaches in Spring River exist a few miles downstream from Verona. Such reaches could be areas of greater sediment accumulation, thus possible greater dioxin contamination. The USGS will have primary responsibility for locating and measuring streamflows and springflows.

Sediment streambed samples will be collected at approximately six stations along the Spring River and analyzed for sediment particle size. Suspended-sediment samples will also be collected at three of the stations during two summer (July-August) storm events. These stations are expected to be Spring River just upstream from Honey Creek, Honey Creek near the mouth, and Spring River at the gaging station at Larussell. The suspended-sediment samples will be analyzed for concentration; selected samples will be analyzed for particle size. The USGS will have responsibility for the sediment data-collection effort.

Time frame:

Initial parts of the investigation are underway. However, the main thrust of the investigation cannot begin until late June or early July. The geologic mapping and acquisition of the ground-water data will be completed during July and August. The seepage runs, losing-gaining stream identification, and spring-related aspects of the investigation likely cannot be completed until late August.

Study coordination:

The investigation would be completed best as a coordinated effort between the DG&LS and USGS-WRD.

Product of the study:

Ground-water gradient(s) will be determined for the shallow ground-water aquifer. Shallow aquifer-deep aquifer relationships will be reviewed. Springs will be located and, where possible, an appropriate outline of the watershed for the spring will be provided. The delineation of losing stream or flow loss segments of the Spring River should aid in locating sites that might have contaminated sediments accumulated in the stream channel. Results of streambed particle size and suspended-sediment concentration and

particle-size analyses will provide general information about the dioxin transport mechanism. It is suspected that some perched water tables may exist, and these will be defined where possible. Possible effects of geologic materials on the shallow ground-water table, such as buried sandstone-fill channels, will be described. This will help to define the direction(s) that a contaminated material could move from a potential source within the Baldwin Park area, either toward Spring River or possibly outside the watershed.

Results of the study will be published by DG&LS as an open-file report. By December 1982, a first draft of the report will be furnished to the Environmental Protection Agency for their review. Because of the cursory nature of the study, additional, more detailed work may be suggested in the report.

Cost estimates:

Category	Cost DG&LS	Cost USGS
Compile and review existing data and plan fieldwork	$1,200	$2,500
Geologic mapping	4,000	------
Inventory wells	5,000	7,500
Make seepage runs and dye traces	1,700	5,000
Collect sediment samples	-------	3,800
Analyze sediment samples	-------	1,200
Analyze data and prepare report	4,000	7,500
Meetings with Environmental Protection Agency	400	600
Supplies and computer	2,600	970
Washington Office Technical Service Charge (WOTSC) 14.5 percent	-------	4,930
Subtotals	$18,900	$34,000

Total cost $52,900

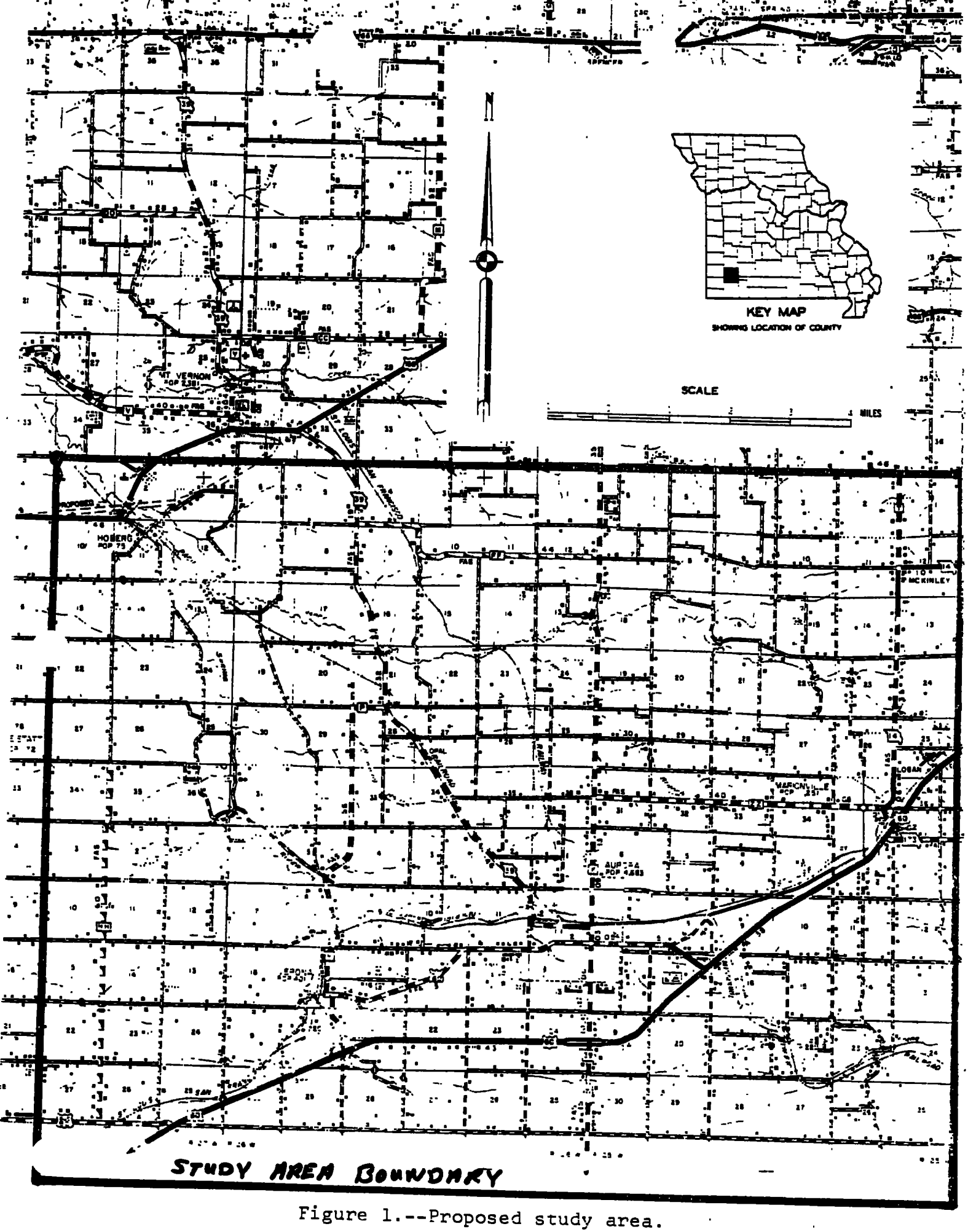

Figure 1.--Proposed study area.